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Abstract

THE U. S. NUCLEAR SAFETY RESEARCH, DEVELOPMENT AND TEST PROGRAM

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The objectives of the United States Atomic Energy Commission Nuclear Safety Research and Development program are to provide a sound technological basis for the rational promotion of nuclear safety in the development, location, design, construction, and operation of reactor systems and associated facilities in land, space, and marine applications. A comprehensive program of analytical, experimental, and engineering scale test investigations is being carried out to develop information in various technological areas. These include: reactor kinetics, fuel-coolant reactions, fission product release, reactor containment, fast reactor safety; engineering field tests of terrestrial and space nuclear systems, post-accident safeguarding and recovery; investigations of radioactive waste treatment, storage, and disposal; and the analysis and evaluation of projects with respect to program objectives. This program is supplemented by, and supports, safety investigations conducted under various specific reactor projects.

A major part of the Nuclear Safety Research and Development program is applicable to the development of civilian power reactors and to the resolution of siting problems in accordance with approved AEC safety policies. Activities related to the increasing use of nuclear devices in space are divided into general research and development, ground tests, and flight tests. They involve actual launches of space vehicles with specially designed payloads and ground tests of space reactors to destruction to directly determine the reactor behavior and consequences resulting from an accident.

The SPERT (Special Power Excursion Reactor Tests) program has produced an extensive background in the transient behavior of light water-cooled and moderated reactor systems including destructive transients in metallic plate-type and UO_2 rod type cores. Fuel meltdown studies in the TREAT facility are providing increased knowledge of the related kinetics and fission product release phenomena. The scope of these studies will be extended with the

proposed construction of the Power Burst Facility which will be capable of testing large fuel assemblies through destruction. A 50 TMW integral engineering test facility is being designed which will permit the conduct of a full-scale loss-of-fluid test in a power reactor. This test, which will be the first of its kind, will be conducted at the National Reactor Test Station in Idaho. Investigations in high-level radioactive waste management have reached the stage at which pilot plants incorporating techniques for the conversion of liquid wastes to solids suitable for permanent disposal have been operated with satisfactory results.

Particular attention has been given in the past two years to the improvement of information feed-back in the planning and execution of the overall program. This has resulted in the establishment of a Nuclear Safety Information Center at Oak Ridge. Mechanisms have been established and used for continuing information exchange with the regulatory and private industrial sectors, and specific industrial firms conducting their own limited investigations of the safety of particular reactor types. Steps are being taken to provide further improvement in the area of information exchange and more intimate participation by industry in the AEC safety program.